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(54) Bicycle crank

(57) A lightweight crank for a bicycle is described which is in the form of an elongate hollow arm having a socket 20 at one end, extending transversely to the axis of the arm, for receiving a pedal and a socket 22 at the other end, also extending transversely to the axis of the arm for mounting the crank on a drive axle, the arm being assembled from two longitudinally extending parts (shown in section in Figure 1 and Figure 3, respectively) and each socket including two annular bosses arranged one on each of the two parts of the arm.

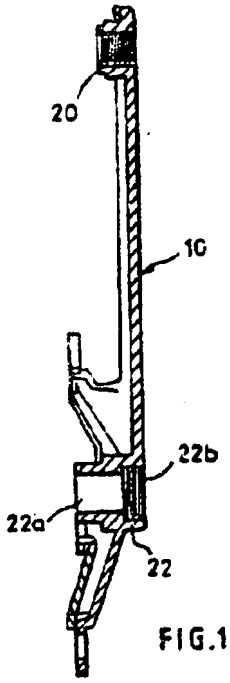

FIG.1.

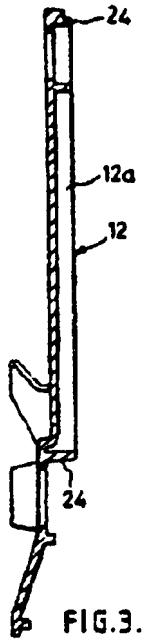

FIG.3.

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy

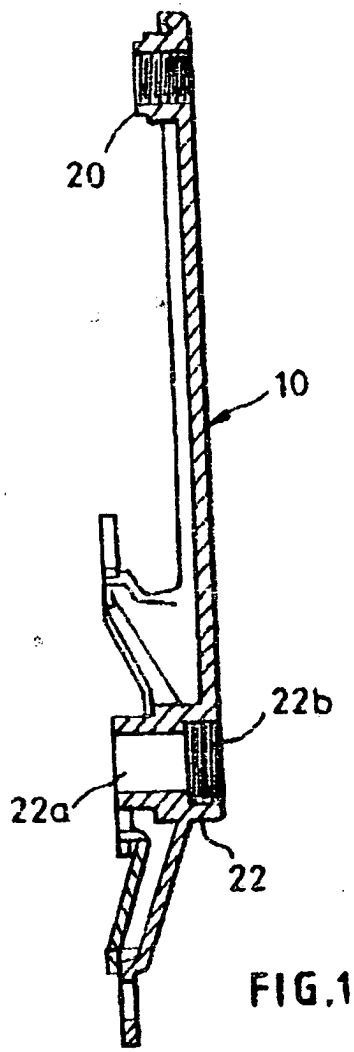

FIG.1.

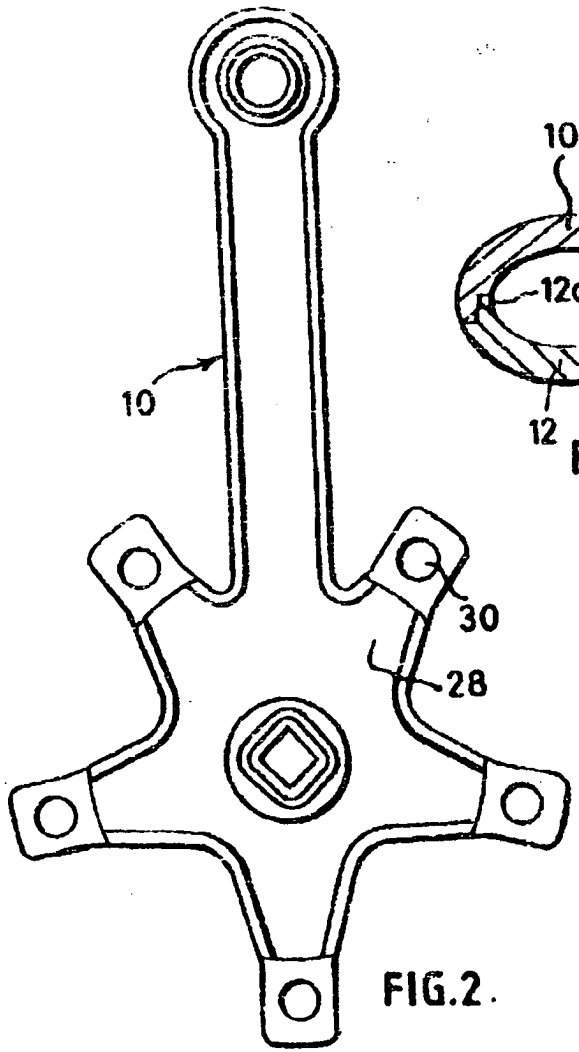

FIG.2.

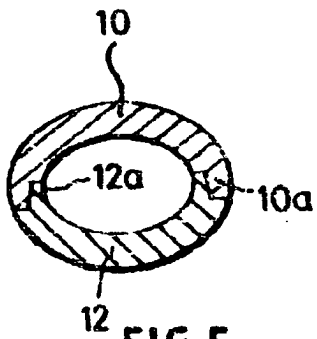

FIG.5.

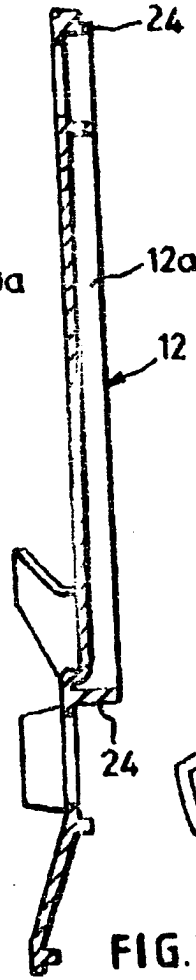

FIG.3.

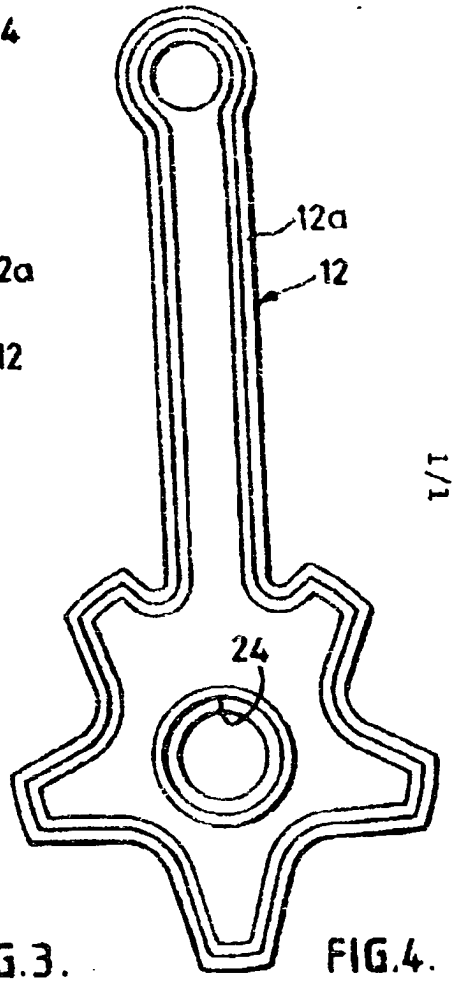

FIG.4.

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BICYCLE CRANK

The present invention relates to a bicycle crank.

It is desirable to be able to reduce the weight of bicycles as much as possible and to this end many steps have been taken to lighten various parts of a bicycle, for example, the frame and the wheels.

The present invention is concerned with reducing the weight of the crank while still enabling it to withstand the considerable forces and torques to which it is subjected during use.

According to the present invention, there is provided a crank for a bicycle, the crank being in the form of an elongate hollow arm having a socket at one end, extending transversely to the axis of the arm, for receiving a pedal and a socket at the other end, also extending transversely to the axis of the arm for mounting the crank on a drive axle, the arm being assembled from two longitudinally extending parts and each socket including two annular bosses arranged one on each of the two parts of the arm.

Preferably, the arm is formed of an alloy consisting mainly of magnesium, such as magnesium AZ 71. Other low density materials can be used instead but magnesium enables a particularly light and strong construction of the crank.

The strength of the arm is increased if the two parts from which it is assembled are designed to fit one inside the other. This requires the two parts to be manufactured to close tolerances and this may conveniently be achieved by high pressure die casting of the two parts followed by machining of the mating surfaces.

Advantageously, the two parts of the arm are bonded to one another by using an epoxy resin. After suitably preparing the mating surface, for example by vapour cleaning using an organic solvent, a bead of hot epoxy resin is applied to the mating surfaces and the latter are pressed together to form a strong bond. Surplus resin squeezed out in the process can be removed by subsequent machining.

The bonding of the two parts to one another using an epoxy resin strengthens the crank and its strength is increased still further if the bosses which form the sockets at each end are also dimensioned to fit closely one inside the other.

The socket for mounting on the drive axle is preferably of non-circular section and includes at its outer end, i.e. the end remote from the axle when in use, an internally threaded section for receiving an extractor tool.

Both the cranks may be formed as set out above and the chain sprocket(s) may be separately mounted on the axle. It is preferred, however, for a sprocket mount to be formed integrally with one of the two crank arms of the bicycle. To this end, the lower end of a crank arm may be formed as a star-shaped housing with holes distributed at regular intervals for receiving sprocket mounting bolts.

The surface of the crank can be suitably treated to resist corrosion during use, for example by chromating or by applying an etch/primer coat of paint followed by a powder coat. Corrosion does not however present a serious problem if the magnesium alloy if suitably selected.

The invention will now be described further, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is a longitudinal section through on part of a crank of the invention,

Figure 2 is a view of the outer surface of the part shown in Figure 1,

Figure 3 is a longitudinal section through the second part of the same crank,

Figure 4 is a view of the outer surface of the part shown in Figure 3, and

Figure 5 is a section through the arm of the crank when its two parts are assembled.

A bicycle crank is formed from two parts which are bonded to one another. The first part 10 is shown in Figures 1 and 2, while Figures 3 and 4 show the other part 12.

The part 10 and 12 are both generally concave and are formed by pressure die casting of a magnesium alloy, such as AZ 71. A lip 12a extends around entire periphery of the part 12 and is received within a lip 10a of the part 10 as shown in Figure 5 which is a section through the arm portion of the crank.

An internally threaded annular boss 20 is formed at the upper end of the part 10, as viewed. The upper end of the part 12 is also formed with a boss 24 which is dimensioned to received a reduced diameter portion at the free end of the boss 20 when the parts 10 and 12 are fitted to one another. The two bosses 20 and 24 together define a socket for receiving the threaded end

or the pedal shaft and as the socket is integral at each end with a respective one of the parts 10 and 12 of the crank, it is well braced to withstand torques applied to the pedal shaft by the weight of the cyclist.

A socket for fitting onto the end of the drive axle is similarly defined by two bosses 22 and 24 formed at the lower end, as viewed, of the two parts 10 and 12 of the crank arm. The boss 22 has a tapering square hole 22a and an extraction threaded 22 for receiving a tool which permits the crank to be removed from a drive axle having a tapering square end without damaging the crank arm.

The illustrated crank also includes an integral sprocket mount on which the chain sprockets of the bicycle can be fixed. For this purpose, the crank arm includes at its lower end a hollow housing 28 in the shape of a five pointed star having near each point a hole 30. The holes 30 lie on a circle centred on the socket 22, 24 for the drive axle. Prior to fitting the crank arm to the drive axle, the chain sprocket(s) is fitted to the sprocket mount and bolts are placed through the holes 30 to secure the sprocket(s) to the crank.

Because of the inter-locking shape of the two parts of the crank, the assembly of the two has significant strength even if not bonded. It is preferred however to secure the two parts 10 and 12 to one another permanently by the use of a hot epoxy resin placed between the rims of the two parts before they are offered to one another. The bond is improved if the two parts are thoroughly cleaned, for example by means of a vapour of an organic solvent, before application of the epoxy resin. Surplus resin extruded from the joint can be removed by subsequent machining of the edges of the crank.

The construction of the crank, as set out above, permits the manufacture of a light yet strong crank. The crank can also be aesthetically pleasing in that the material from which it is made lends itself to a variety of attractive finishes. The magnesium alloy can be chromated to achieve a matt black finish or painted using suitable primers and powder coats. If desired, parts of the underlying allow can be exposed by machining after application of the surface finish to give a striking contrast in a motif.

CLAIMS

1. A crank for a bicycle, the crank being in the form of an elongate hollow arm having a socket at one end, extending transversely to the axis of the arm, for receiving a pedal and a socket at the other end, also extending transversely to the axis of the arm for mounting the crank on a drive axle, the arm being assembled from two longitudinally extending parts and each socket including two annular bosses arranged one on each of the two parts of the arm.

2. A crank as claimed in claim 1, wherein the arm is formed of an alloy consisting mainly of magnesium.

3. A crank as claimed in claim 1 or 2, wherein the two parts from which the arm is assembled are designed to fit one inside the other.

4. A crank as claimed in claim 3, wherein the two parts of the arm are formed by high pressure die casting followed by machining of the mating surfaces.

5. A crank as claimed in any preceding claim, wherein the two parts of the arm are bonded to one another by using an epoxy resin.

6. A crank as claimed in claim 5, wherein the epoxy resin is applied as a bead after the mating surfaces on the two parts have been cleaned.

7. A crank as claimed in any preceding claim, wherein the bosses which form the sockets at each end of the arm are dimensioned to fit closely one inside the other.

8. A crank as claimed in any preceding claim, wherein the socket for mounting on the drive axle is of non-circular section and includes at its outer end, an internally threaded section for receiving an extractor tool.

9. A crank as claimed in any preceding claim, wherein a sprocket mount is formed integrally with the crank.

10. A crank as claimed in claim 9, wherein the lower end of a crank arm is formed as a star-shaped housing having holes for receiving sprocket mounting bolts.

11. A crank for a bicycle constructed, arranged and adapted to operate substantially as herein described with reference to and as illustrated in the accompanying drawings.

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